United States Patent [19]

Pfister

[11] Patent Number: 4,489,313

[45] Date of Patent: Dec. 18, 1984

[54] SIGNAL DIRECTION DETERMINING SYSTEM AND DIRECTIONAL LOOP ANTENNA ARRAY THEREFOR

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[21] Appl. No.: **413,612**

[22] Filed: **Sep. 1, 1982**

[51] **Int. Cl.**[3] **G08B 21/00**

[52] **U.S. Cl.** **340/540;** 340/552; 340/572; 340/658; 343/742; 343/867

[58] **Field of Search** 343/742, 867, 894, 442, 343/443, 448; 340/572, 552, 540, 657, 658, 674, 673

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,657,313 10/1953 Antony 343/890

4,375,289 3/1983 Schmall et al. 340/572

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[57] **ABSTRACT**

A directional loop antenna array is provided by two flat parallel spaced apart open loops with a shorted turn disposed between the open loops equidistant therefrom. The signals from the open loops are vectorially added and subtracted in a sum and difference circuit and the phase angle between the sum and difference signals is ascertained in a phase detector circuit that feeds an indicator. The so determined phase angle is either greater or less than 90° depending upon the relative magnitudes of the loop signals.

10 Claims, 8 Drawing Figures